

**REMARKS**

Applicants thank the Examiner for acknowledging the claim for priority under 35 U.S.C. § 119, and receipt of a certified copy of the priority document submitted November 18, 2003.

Applicants thank the Examiner for considering the reference cited with the *Information Disclosure Statement* filed November 18, 2003.

Applicants thank the Examiner for acknowledging the election without traverse of claims 1-30 and 35-59 in the Response to Restriction Requirement filed April 12, 2005.

**Status of the Application**

Claims 1-65 are all the claims pending in the Application, as claims 60-65 are hereby added. Claims 1-30 and 35-59 stand rejected. Claims 31-34 stand withdrawn from consideration.

Claim 36 is amended herein in an editorial, non-limiting, manner. Thus, no estoppel applies.

**Anticipation Rejection**

The Examiner has rejected: (1) claims 1-6, 12, 18-24, 28-30 and 35 under 35 U.S.C. § 102(e) as being anticipated by *Ikeda et al.* (US 6,441,451; hereinafter "*Ikeda*"); (2) claims 7-11, 13-17 and 52 under 35 U.S.C. § 103(a) as being unpatentable over *Ikeda* in view of *Mori et al.* (US 5,894,144; hereinafter "*Mori*")<sup>1</sup> (3) claim 26 under 35 U.S.C. § 103(a) as being unpatentable over *Ikeda* in view of *Kurtz et al.* (US 6,595,066; hereinafter "*Kurtz '066*"); (4) claims 36-39, 53, 54 and 59 under 35 U.S.C. § 103(a) as being unpatentable over *Ikeda* in view

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<sup>1</sup> This reference is mis-identified in the Office Action as "*Mora*".

of *Kurtz et al.* (US 6,272,929; hereinafter “*Kurtz ‘929*”); and (5) claims 40-51 and 55-58 under 35 U.S.C. § 103(a) as being unpatentable over *Ikeda* in view of *Kurtz ‘929* and further in view of *Mora*. These rejections are respectfully traversed.

*Independent Claims 1 and 35*

The Examiner alleges that *Ikeda* discloses all of the features of independent claims 1 and 35 in column 2, lines 48-62 and Figures 1(a)-(f) (*O.A.*, p. 2), but fails to cite specific elements of *Ikeda* that he alleges correspond to the recited “substrate” or “sensor.” However, since the Examiner also alleges that *Ikeda*’s first insulating layer 120 is equivalent to claim 18’s “insulation layer arranged between the substrate and the support,” (*O.A.*, p. 3, lines 1-2), Applicants believe that the Examiner is taking the position that *Ikeda*’s “diaphragm” (*i.e.*, a combination of diaphragm layers 150, 170 and second conductive layer 160; *see* col. 8, lines 37-40) is equivalent to the recited “substrate.”

Applicants respectfully submit that it is more unclear as to what portions of *Ikeda* the Examiner is alleging to be comparable to the recited “sensor.” For the purposes of this response, Applicants believe that the Examiner is taking the position that at least one (or both) of the electrodes 161 and 110 are equivalent to the recited “sensor.”

However, even in view of the above, Applicants respectfully submit that *Ikeda* teaches or suggests independent claim 1’s recitation of “a diaphragm formed in the substrate and arranged to be displaceable by a pressure medium acting on the first surface of the substrate,” or independent claim 35’s recitation of “forming a diaphragm in the first surface of the substrate so that it is displaceable by a pressure medium acting on the first surface of the substrate.” Rather, *Ikeda*’s “diaphragm” (*i.e.*, a combination of diaphragm layers 150, 170 and second conductive

layer 160) comprises a diaphragm in and of itself. Applicants respectfully submit that it is unreasonable to consider any portion of this “diaphragm” as also being part of a “substrate.”

Additionally, Applicants respectfully submit that *Ikeda* fails to teach or suggest independent claim 1’s recitation of “a sensor arranged on the second surface of the substrate to detect displacement of the diaphragm,” or independent claim 35’s recitation of “forming a sensor on the second surface of the silicon substrate to detect displacement of the diaphragm.” Specifically, Applicants respectfully submit that *Ikeda* cannot reasonably be read as providing any sensors on the second side of the “diaphragm” (*i.e.*, a combination of diaphragm layers 150, 170 and second conductive layer 160). Rather, the second side of the “diaphragm” only: (1) contacts first insulating layer 120; or (2) defines cavity 141. Further, electrodes 161 and 110 (*i.e.*, the portions the Examiner seemingly cites as being comparable to the recited “sensor”) are arranged either within *Ikeda*’s “diaphragm” or below insulation layer 120.

Thus, Applicants respectfully submit that independent claims 1 and 35 are patentable over the applied references.

Further, Applicants respectfully submit that rejected dependent claims 2-30 and 36-59 are: (1) allowable at least by virtue of their dependency; and (2) separately patentable over the applied references (as discussed in the following sections).

*Dependent Claim 2-6, 12, 18-24, 27, 28-30*

For example, claim 6 recites that “the support includes a through-hole interconnection for outputting a signal from the sensor.” While *Ikeda* does provide a through hole 190, this through hole 190 is connected to cavity 141 for pressure adjustment, not for “outputting a signal from the sensor.”

Further, claim 19 recites that “sealing metal [is] arranged between the substrate and the support,” while claims 20 and 22 specify that “the sealing metal is arranged laterally outside the through-hole interconnection, relative to the sensor,” and claims 21 and 24 specify that “the sealing metal is arranged laterally inside the through-hole interconnection, relative to the sensor.” The Examiner alleges that *Ikeda* discloses these features in column 10, line 64 - col. 11, line 6. Thus, the Examiner seems to be alleging that one of the first conductive layer 110, second conductive layer 160, or third conductive layer 180 is comparable to the recited “sealing metal.”

Applicants respectfully disagree, and submit that none of these conductive layers 110, 160 or 180 can reasonably be read as being comparable to the recited “sealing metal,” as layers 110 and 160 provide no particular sealing, and as layer 180 is not arranged between the portions that the Examiner seems to be comparing to the “substrate” (*i.e.*, a combination of diaphragm layers 150, 170 and second conductive layer 160) and the “support” (*i.e.*, substrate 100).

Further, with regard to claims 20-24, Applicants respectfully submit that layers 110 and 160 cannot reasonably be read as being either “laterally inside” or “laterally outside” the through hole connection, relative to the sensor, as the Examiner seems to be alleging that these layers 110 and 160 are themselves part of the sensor.

Further, claim 27 recites that “the substrate has a first thickness; and the diaphragm comprises a portion of the substrate that has a second thickness thinner than the first thickness.” The Examiner alleges that *Ikeda* discloses these features in column 2, lines 48-62 and FIGS. 1(a)-(f) (*O.A.*, p. 2).

Applicants respectfully disagree, and submit that *Ikeda*’s “diaphragm” has layers 150, 160 and 170 of a constant thickness - not having thicker and thinner portions.

Further, claim 28 recites that “the offset portion of the first surface of the support and the second surface of the substrate define a space therebetween.” Applicants respectfully submit that *Ikeda* fails to teach or suggest any particular “space” defined by *Ikeda*’s “diaphragm” (*i.e.*, a combination of diaphragm layers 150, 170 and second conductive layer 160) and any portion of substrate 100. Rather, cavity 141 is actually defined by *Ikeda*’s “diaphragm” and first insulating layer 120.

Further, claims 29 and 30 specify, respectively, that the substrate and the support are joined together by “anodic bonding,” and “an adhesive layer arranged therebetween.” Applicants respectfully submit that *Ikeda* fails to teach or suggest any such “anodic bonding” or “adhesive layer.” Rather, *Ikeda* discloses only diffusion, etching and CVD methods for forming the respective elements on substrate 100.

Dependent Claims 7-11, 13-17 and 52

Regarding dependent claims 7-11, 13-17 and 52, the Examiner concedes that *Ikeda* fails to teach or suggest: the recited “through-hole” with a “conductive material filled” therein (of claims 7-9 and 13-15); or the recited “metal pad” (of claims 10, 11, 16, 17 and 52). However, the Examiner alleges that *Mori* discloses such features, and that one of ordinary skill in the art at the time of the invention (“one of skill”) would have been motivated to modify *Ikeda* in view of *Mori* “for the purpose of improving the reliability of the electrical connection.”

Applicants agree with the Examiner’s concession that *Ikeda* fail to teach or suggest any through-hole filled with conductive material, or its connection to metal pads. However, Applicants respectfully disagree with the Examiner’s allegation that that one of skill would have been motivated to modify *Ikeda* in view of *Mori*, at least as the Examiner alleges.

First, *Ikeda* is directed to a pressure transducer that detects a varying capacitance to determine a pressure. In contrast, *Mori* is directed to an acceleration sensor which detects acceleration by relative movement and electrical connection of two substrates. Accordingly, the structure and function of these sensors is completely different. Thus, Applicants respectfully submit that one of skill looking to modify *Ikeda* would not have looked to *Mori*, even in a general sense.

Second, regarding claims 7-11, *Ikeda* provides output terminals 181 and 182 on an upper surface thereof. Thus, Applicants respectfully submit that there would have been any need or reason to modify *Ikeda* to provide a through hole passing through substrate 100 (seemingly alleged by the Examiner to correspond to the recited “support”). Thus, Applicants respectfully submit that that one of skill would not have been motivated to modify *Ikeda*’s substrate 100 with any through-hole, let alone the through-hole of *Mori*.

Dependent Claim 26

The Examiner concedes that *Ikeda* fails to teach or suggest claim 26’s recitation that “the sensor comprises a piezo-resistive element,” but alleges that *Kurtz* ‘066’s piezoresistive elements 14 are comparable to such a feature. Further, the Examiner alleges that one of skill would have been motivated to modify *Ikeda* to include *Kurtz* ‘066’s piezoresistive elements 14 “for the purpose of enabling the sensor to receive a force or pressure from any direction” (*O.A.*, pg. 4).

As an initial matter, Applicants agree with the Examiner’s concession that *Ikeda* fails to teach or suggest any “piezo-resistive element.” However, Applicants respectfully disagree with the Examiner’s allegation that one of skill would have been motivated to modify *Ikeda* in view of *Kurtz* ‘066, at least as the Examiner alleges.

Specifically, *Ikeda* is specifically directed to a pressure transducer that detects a varying capacitance to determine a pressure. As such, its entire structure (*e.g.*, electrodes 110 and 160 with an interposed cavity 141) is configured to measure a capacitance. In contrast, pressure in *Kurtz '066* is measured via a piezoresistive element 14, which is a mutually exclusive, alternative, method for measuring pressure. Thus, the addition of *Kurtz '066*'s piezoresistive elements 14 would not add any functionality or benefit to *Ikeda*, as pressure is already being measured therein via changes in capacitance, and would be redundant.

Dependent Claims 36-39 53, 54 and 59

The Examiner concedes that *Ikeda* fails to teach or suggest claim 36's recitations of: "forming a glass substrate;" "forming a recess;" or "joining the glass support to the silicon" substrate, but alleges that the embodiment disclosed by FIG. 1 of *Kurtz '929* discloses such features. Further, the Examiner alleges that one of skill would have been motivated to modify *Ikeda* to include *Kurtz '929*'s glass support "for the purpose of accessing various contact areas of the silicon structure associated with various sensors" (O.A., pg. 5).

Applicants agree with the Examiner's concession that *Ikeda* fails to teach or suggest "forming a glass substrate;" "forming a recess;" or "joining the glass support to the silicon" substrate. However, Applicants respectfully disagree with the Examiner's allegation that one of skill would have been motivated to modify *Ikeda* to utilize the cited features of *Kurtz '929*.

Specifically, *Ikeda* is directed to a pressure transducer that detects a varying capacitance to determine a pressure. As such, its entire structure (*e.g.*, electrodes 110 and 160 with an interposed cavity 141) is configured to measure a capacitance. In contrast, *Kurtz '929* is directed to a pressure transducer utilizing a piezoresistive element, which is a mutually exclusive,

alternative, method for measuring pressure. Thus, Applicants respectfully submit that one of skill would not have looked to modify the specific capacitance-based structure of *Ikeda* with the piezoresistive element-based structure of *Kurtz '929*.

*Dependent Claims 40-51 and 55-58*

The Examiner concedes that his proffered combination of *Ikeda* and *Kurtz '929* fails to teach or suggest the features recited in dependent claims 40-51 and 55-58, but alleges that the embodiment disclosed by FIG. 1 of *Mora* discloses such features. Further, the Examiner alleges that one of skill would have been motivated to modify *Ikeda* and *Kurtz '929* with the features of *Mora* “for the purpose of improving the reliability of the electrical connection” (O.A., pg. 5).

As noted above, Applicants respectfully submit that one of skill would have been motivated to modify *Ikeda* in view of either *Kurtz '929* or *Mora*, as discussed in detail above.

Additionally, regarding claims 55-58, the Examiner alleges that *Ikeda* discloses the “sealing metal” recited in each of these claims, along with the specific positioning of the “sealing metal” either “laterally inside” or “laterally outside” the through hole connection, relative to the sensor. However, with respect to the disclosure of *Ikeda*, Applicants disagree with the Examiner for at least the reasons discussed above with respect to claims 20-23.

Thus, Applicants respectfully request that the Examiner withdraw all of the above rejections.

*New Claims*

Claims 60-65 are hereby added. Claims 60-65 are: (1) dependent from claims 12, 19, 20, 21, 22, and 23, respectively; (2) fully supported at least by the Figures of the instant Application;



and (3) respectfully submitted to be allowable both by virtue of their dependency, and by virtue of the features recited therein.

**Conclusion**

In view of the foregoing, it is respectfully submitted that claims 1-65 are allowable. Thus, it is respectfully submitted that the application now is in condition for allowance with all of the claims 1-65.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Please charge any fees which may be required to maintain the pendency of this application, except for the Issue Fee, to our Deposit Account No. 19-4880.

Respectfully submitted,



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